



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2002GU5B

Title: Inventory of Karst Features Relating to Past and Present Groundwater Flow on Tinian, CNMI, in Terms of the Carbonate Island Karst Model

Project Type: Research

Focus Categories: Groundwater, Hydrology, Climatological Processes

Keywords: Groundwater, Island Karst, Carbonate Island Aquifers

Start Date: 03/01/2002

End Date: 02/28/2003

Federal Funds Requested: \$27,190

Non-Federal Matching Funds Requested: \$0

Congressional District:

Principal Investigator:

John Jenson
University of Guam

Abstract

The island of Tinian in the Commonwealth of the Northern Mariana Islands relies on groundwater for its potable water. Groundwater is derived from the uplifted limestone aquifer that forms nearly the entire surface of the island. In spite of the fact that the island has seen important development in recent years, to include the installation of a large tourist resort, there has yet to be a systematic study of the karst geology of the aquifer. This project proposes to survey the karst features that control the input, transport, and discharge of fresh water from the island. Groundwater developers and managers on Tinian will benefit directly from improved specific knowledge of aquifer properties and more reliable explanations of the behavior of the aquifer. Specific work to be done includes mapping and cataloging karst surface features, caves, and coastal discharge features, in preparation for eventually undertaking a long-term comprehensive hydrogeologic study of Tinian's island karst aquifer. In addition to obtaining such specific data to support sustainable use of Tinian's aquifer, the proposed project will broaden ongoing efforts to develop a more accurate and complete conceptual model of carbonate island karst aquifers in general. Standard hydrologic models for watershed management and well-field design are well known to be inadequate for the karst of temperate continental aquifers. Karst aquifers in island and coastal settings are still more complicated, and even such models as have been developed for temperate continental karst aquifers do not accommodate the unique geologic complexity and hydrologic properties of island and coastal karst aquifers. Planning, design, and management of systems for groundwater development of groundwater on carbonate aquifers requires a better understanding of their unique properties. Work begun on the relatively uncomplicated aquifers of Atlantic-Caribbean islands has recently been completed on Guam and extended to Saipan, and with this project, will be extended to Tinian as well. Tinian is unique in that it is a composite island with relatively compact shape and simple topography. This makes it ideal for testing certain hypotheses regarding the evolution of island karst aquifers.

The work will support an M.S. thesis as well as undergraduate research. Results will be presented in professional journals, international conferences, and website publications, and made accessible to local

water resource professionals and educators through technical reports, local conferences, and outreach publications.